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Piretti

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(54) **CHAIR WITH A TILTING BACKREST**

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(52) **U.S. Cl.**
CPC ***A47C 7/443*** (2013.01)

(58) **Field of Classification Search**
CPC A47C 7/443
USPC 297/301.4
See application file for complete search history.

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(57) **ABSTRACT**

A chair comprising: a base structure, a seat fixed to the base structure, a backrest, and a pair of oscillation joints which connect the backrest to the seat or to the base structure so as to allow tilting of the backrest around a transverse axis between a rest position and a backwardly tilted position, wherein each of said oscillation joints comprises: an essentially L-shaped rigid support a rigid lever articulated to the rigid support, and having a first and a second lever arm located on opposite sides with respect to the articulation axis, and an elastic device comprising a telescopic element and a compression spring, wherein the elastic device applies an elastic force between said rigid support and said first lever arm and wherein said second lever arm protrudes outwards from said rigid support and is fixed to a corresponding side edge of the backrest.

20 Claims, 7 Drawing Sheets

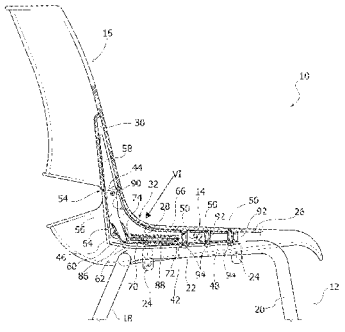

FIG. 2

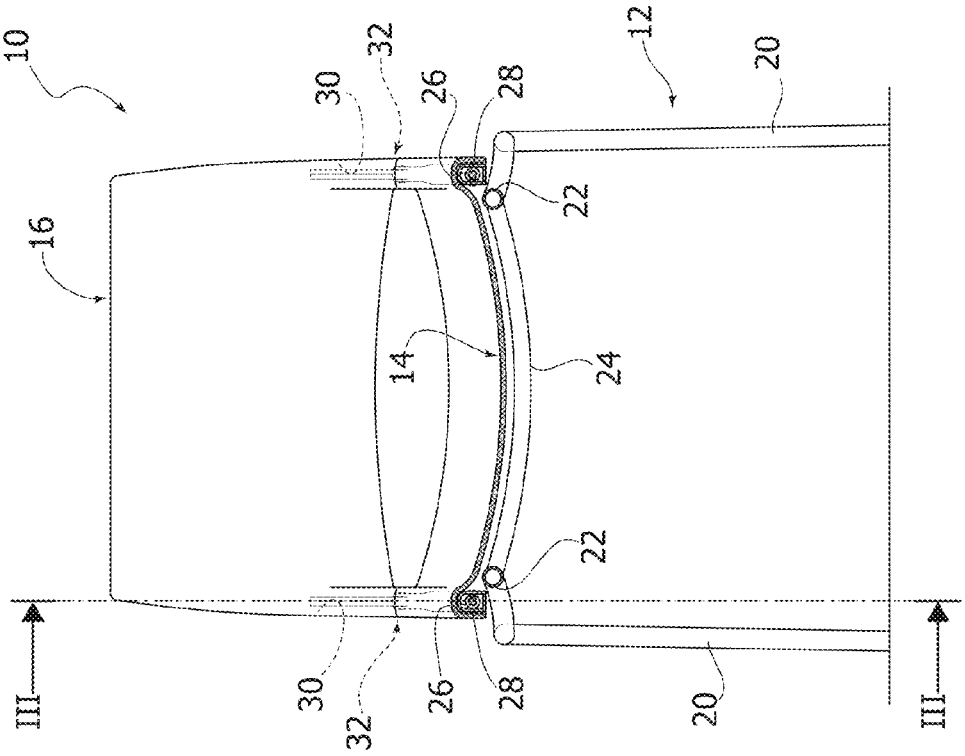
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FIG. 1

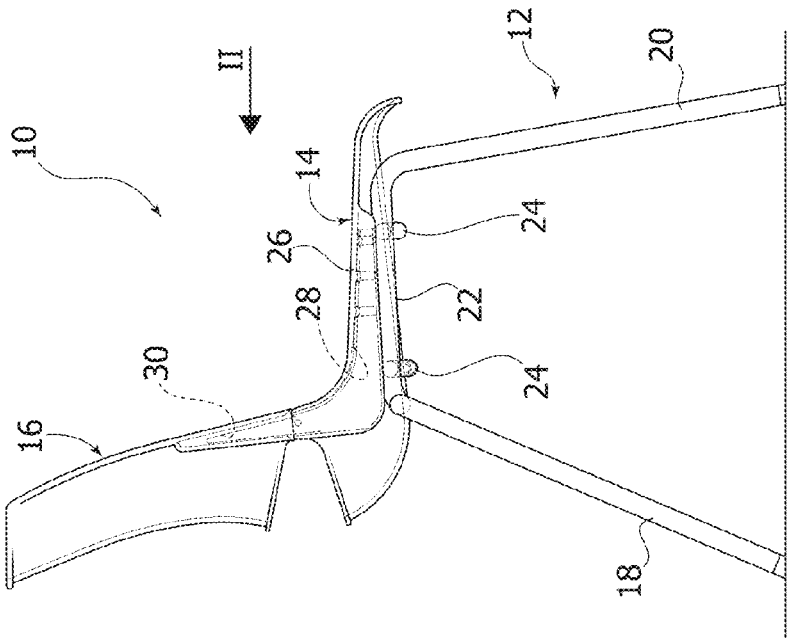
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FIG. 4

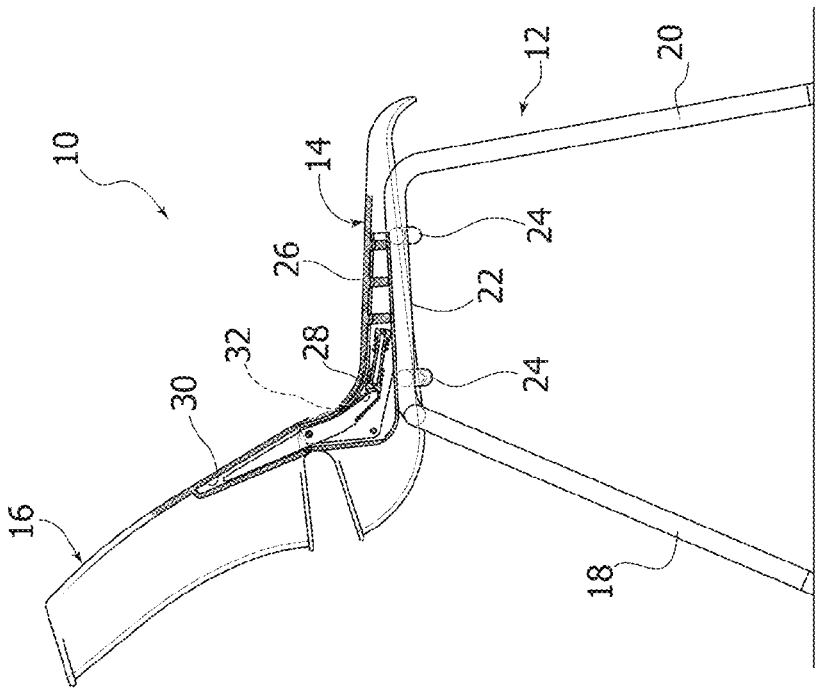

FIG. 3

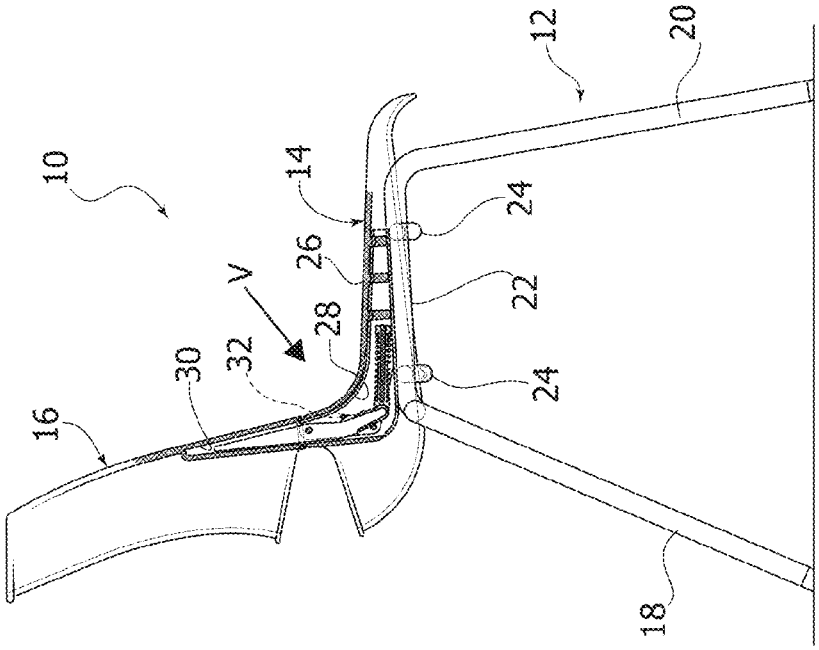

FIG. 5

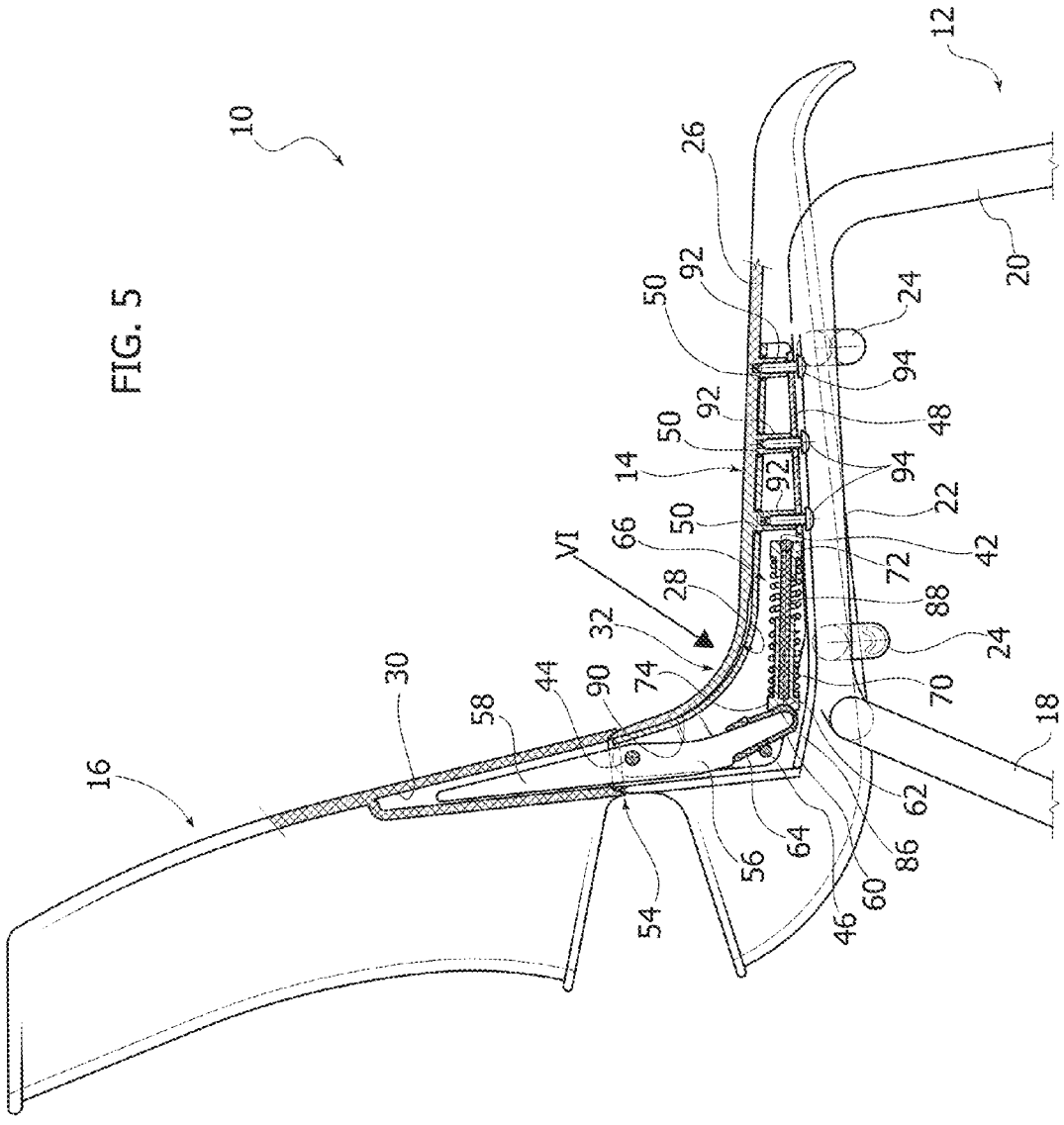
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FIG. 6

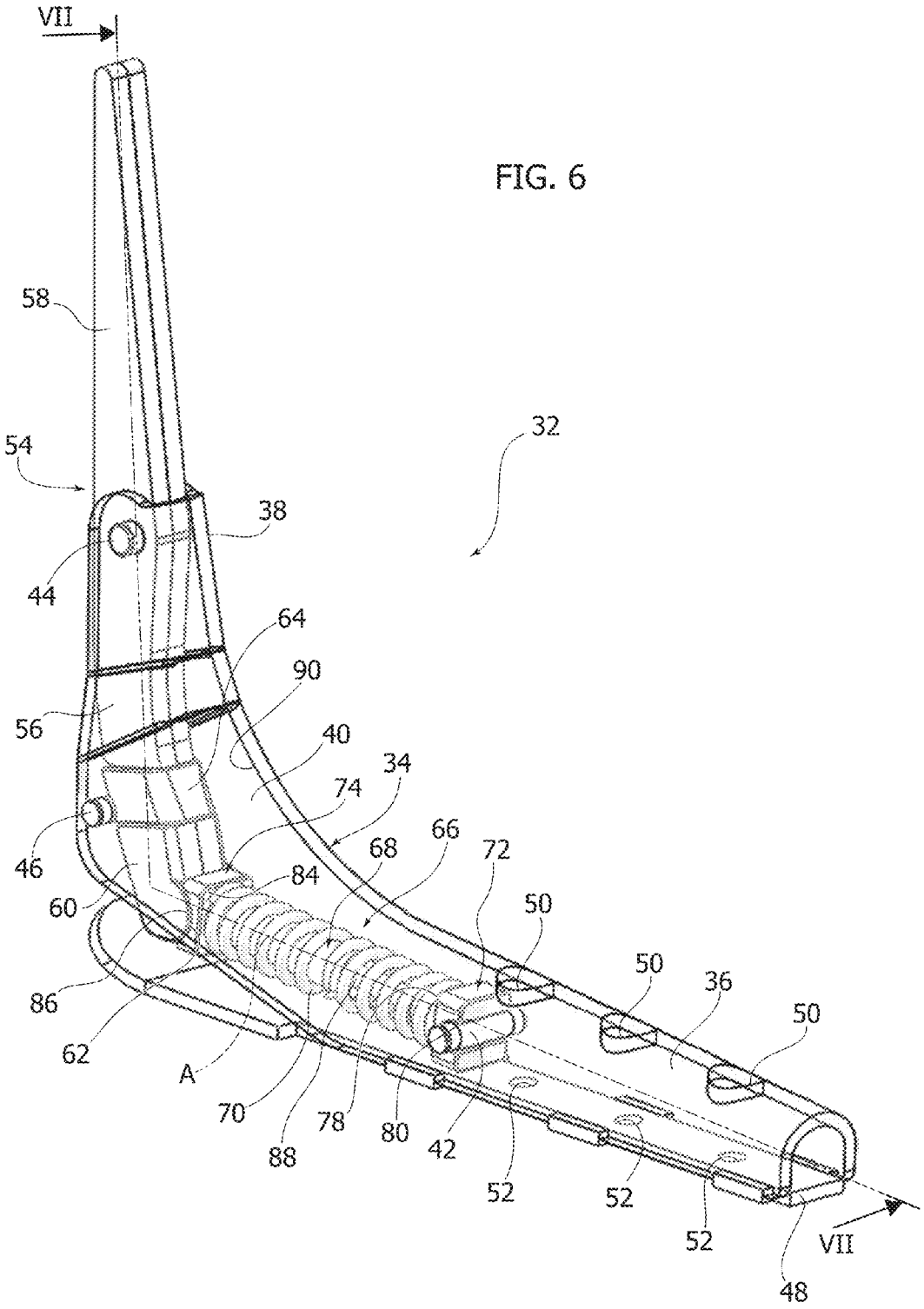
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FIG. 7

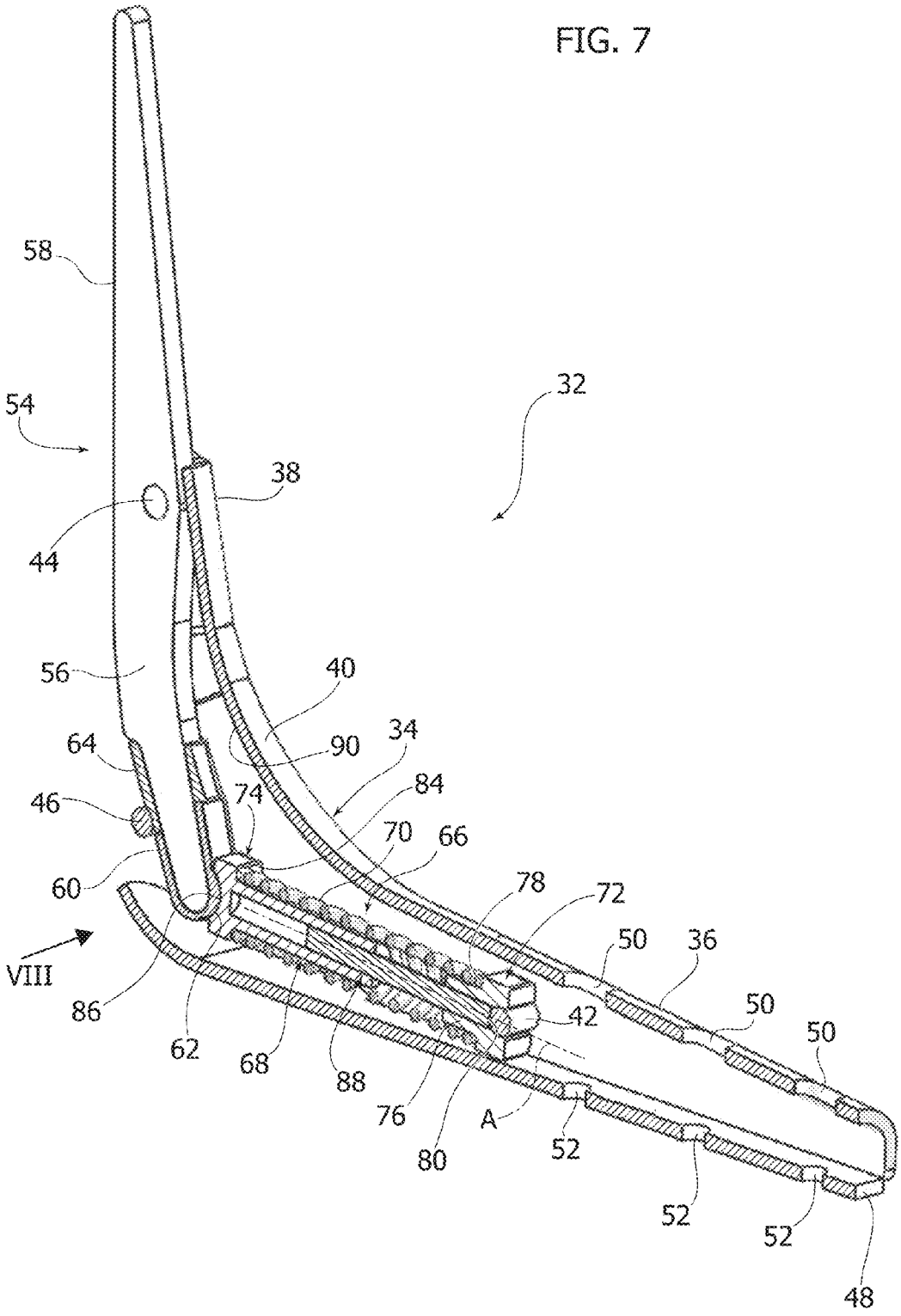
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FIG. 8

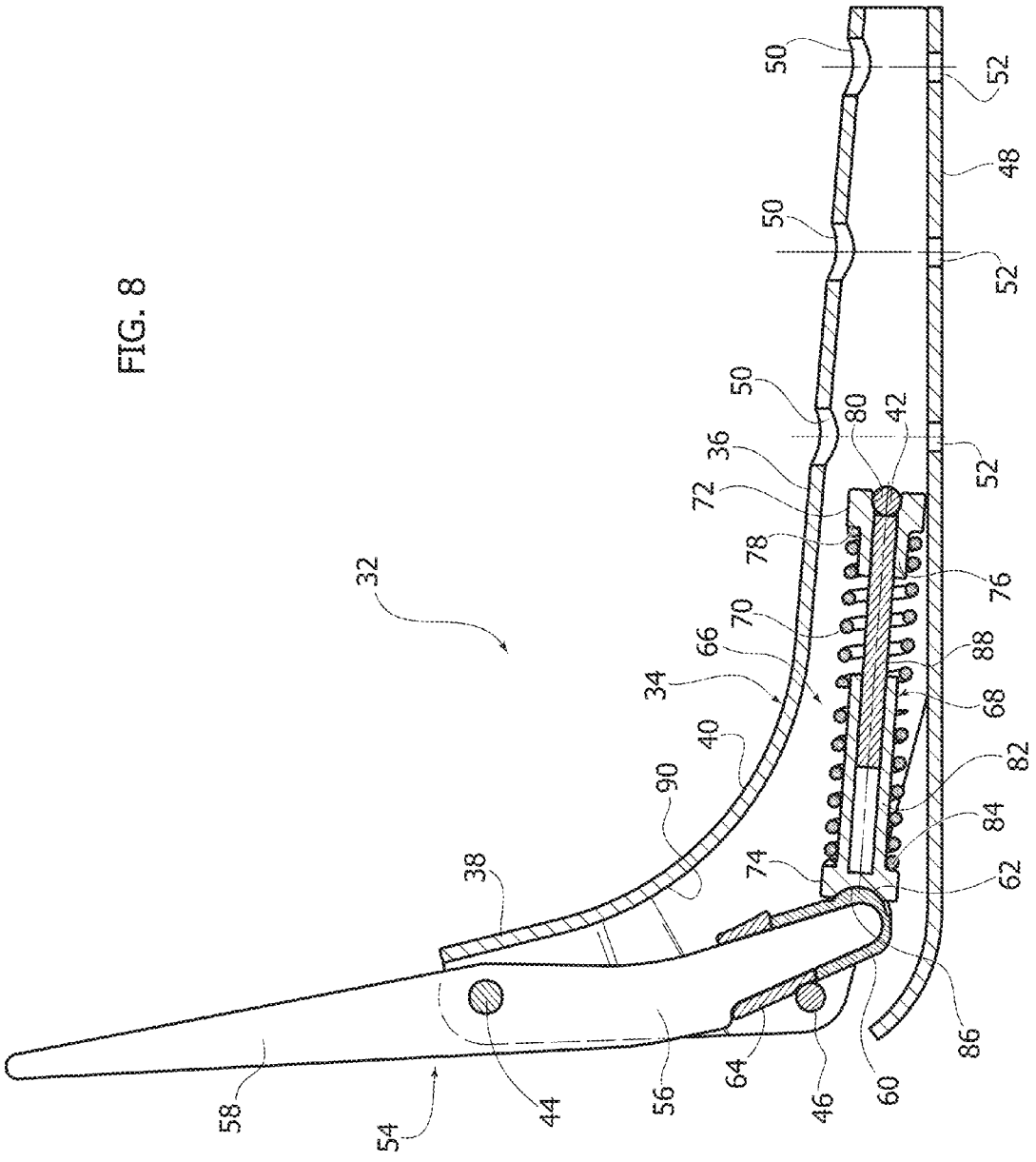
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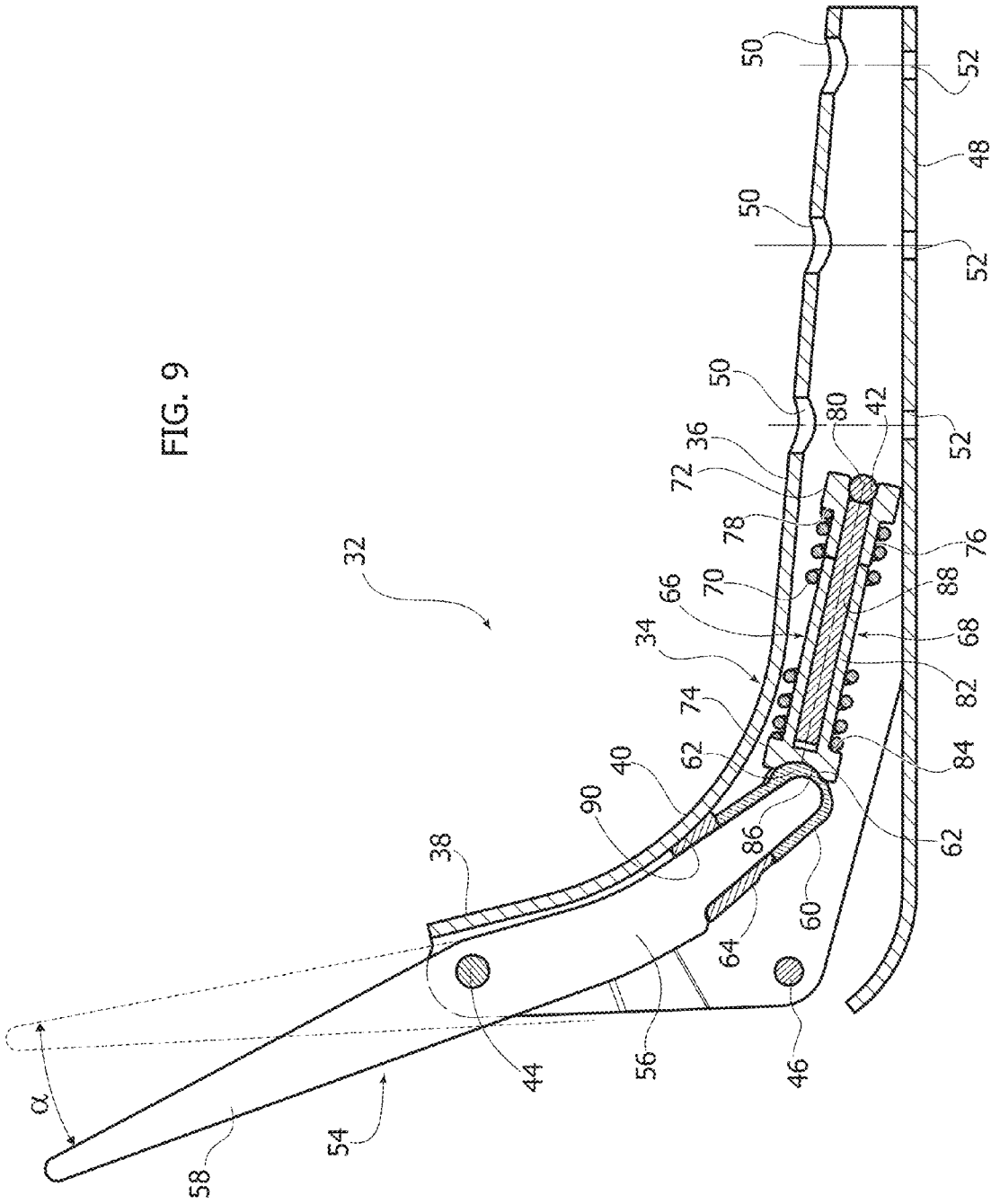
FIG. 9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CHAIR WITH A TILTING BACKREST

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims benefit of Italian patent application number TO2014A000407, filed May 22, 2014, which is herein incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a chair with a tilting backrest capable of tilting backwards under a thrust applied by the user's back.

2. Description of Prior Art

In the state of the art, there are various known solutions of chairs in which the backrest is connected to a fixed support structure by means of a pair of elastic joints, each of which comprises an upper support inserted into a tubular portion of the backrest, a lower support inserted into a tubular element of the fixed support structure and an elastic element, which allows an inclination between the upper support and the lower support.

For example, the document EP2183997 by the same Applicant describes a chair comprising a base structure including two rear tubular elements, a backrest having two tubular portions and two elastic devices, each of which has an upper support inserted into a tubular portion of the backrest, a lower support inserted into the corresponding tubular element of the base structure and an elastic element deformable by bending to allow an oscillation between the upper support and the lower support, wherein each of the elastic devices comprises a plurality of stacked sectors, arranged between the upper support and the lower support.

The elastic joints equipped with elastic elements that are deformable by bending have the drawback of a limited elastic force for opposing the backward thrust applied by the user. In principle, with elastic elements in compression formed, for example, by helical compression springs, it would be possible to increase the force provided by the elastic joints that contrast the backward thrust applied by the user on the backrest of the chair. However, with helical compression springs arranged coaxially to the side uprights of the backrest, the lever arm used for the compression of the springs would be limited.

Furthermore, the elastic joints usually require additional covering elements, such as bellows or the like. This penalizes the chair from an aesthetic point of view.

SUMMARY OF THE INVENTION

The present invention aims to provide a new chair with a tilting backrest which overcomes the problems of the prior art.

According to the present invention, this object is achieved by a chair with a tilting backrest having the characteristics forming the subject of claim **1**.

The claims form an integral part of the disclosure provided in relation to the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described in detail with reference to the attached drawings, given purely by way of non-limiting example, in which:

FIG. **1** is a side view of a chair according to the present invention.

FIG. **2** is a front view according to the arrow II of FIG. **1**.

FIG. **3** is a cross-section according to the line III-Ill of FIG. **2**.

FIG. **4** is a cross-section analogous to FIG. **3** illustrating the chair with the backrest in the position of maximum backward tilt.

FIG. **5** is a cross-section on an enlarged scale of the part indicated by the arrow V of FIG. **3**.

FIG. **6** is a perspective view in partial transparency of an oscillation joint indicated by the arrow VI in FIG. **5**.

FIG. **7** is a perspective cross-sectional view according to the line VII-VII of FIG. **6**.

FIGS. **8** and **9** are cross-sectional views according to the arrow VIII of FIG. **7** illustrating the oscillation joint in the rest position and in the position of maximum backward tilt, respectively.

DETAILED DESCRIPTION

With reference to FIGS. **1** to **5**, the reference **10** indicates a chair with a tilting backrest according to the present invention. The chair **10** comprises a base structure **12**, a seat **14** and a backrest **16**. In the embodiment illustrated in the figures, the base structure **12** comprises a pair of rear legs **18** and a pair of front legs **20**. The rear legs **18** are joined to the corresponding front legs **20** by means of upper longitudinal elements **22**. The upper longitudinal elements **22** are fixed to each other by means of transverse connecting elements **24**.

The seat **14** is preferably formed of a body made of injection-molded plastic material. The seat **14** has two downwardly-bent longitudinal edges **26** that form two hollow side housings **28**. The seat **14** is fixed to the base structure **12** by any known way, for example by snap-fitting or screws.

The backrest **16** is preferably formed of a single panel of injection-molded plastic material, having an arcuate shape and equipped with two integral hollow seats **30** open at the bottom. The hollow seats **30** are located at the lower ends of the side edges of the backrest **16**.

The chair **10** comprises two oscillation joints **32** which connect the backrest **16** to the seat **14** or to the base structure **12**.

With reference to FIGS. **6** to **8**, each oscillation joint **32** comprises a rigid support **34** consisting, for example, of pressed sheet metal. The rigid support **34** comprises a first arm **36** and a second arm **38** joined together by an arcuate portion **40**. The two arms **36**, **38** are essentially oriented at 90° to each other, so that the rigid support **34** is essentially L-shaped. In cross-section the first arm **36**, the second arm **38** and the arcuate portion **40** are essentially U-shaped. The first arm **36**, the second arm **38** and the arcuate portion **40** are preferably formed in a single piece.

The rigid support **34** carries a first transverse pin **42**, a second transverse pin **44** and a third transverse pin **46**. The pins **42**, **44**, **46** are parallel to each other and are fixed at their ends to opposite side walls of the rigid support **34**. The first transverse pin **42** is located within the first arm **36**, the second transverse pin **44** is located within the second arm **38** and the third transverse pin **46** is located within the arcuate portion **40**. The rigid support **34** is preferably fitted with a closing element **48** fixed to the open edge of the first arm **36**. The first arm **36** is equipped with a plurality of holes **50** aligned with corresponding holes **52** formed in the closing element **48**.

Each oscillation joint **32** comprises a lever **54** articulated to the second arm **38** of the rigid support **34** by means of the second transverse pin **44**. The lever **54** has a first lever arm **56** and a second lever arm **58** which extend from opposite sides relative to the second transverse pin **44**. The lever **54** is rigid and is preferably formed of a single piece of metallic material. A body of relatively rigid plastic material **60** having a rounded head **62** can be applied to a distal end of the first lever arm **56**. A sleeve of relatively soft plastic material **64** can be applied on a portion of abutment of the first lever arm **56**. In the illustrated example, the sleeve of relatively soft plastic material **64** is located between one end of the body of relatively rigid plastic material **60** and a shoulder of the first lever arm **56**.

Each oscillation joint **32** comprises an elastic device **66**. The elastic device **66** comprises a telescopic element **68** and at least one compression spring **70**, preferably formed by a helical spring. The telescopic element **68** comprises a first supporting body **72** and a second supporting body **74**. The first and the second supporting bodies **72**, **74** are preferably made of relatively rigid plastic material. The first support body **72** has a first tubular portion **76**, a first shoulder **78** and a first semi-cylindrical seat **80**. The second support body **74** has a second tubular portion **82**, a second shoulder **84** and a second semi-cylindrical seat **86**. The telescopic element **68** comprises a guide shaft **88** which slidably engages the first tubular portion **76** and the second tubular portion **82**, so as to guide the second support body **74** with respect to the first support body **72** along a longitudinal axis A.

The first semi-cylindrical seat **80** of the first support body **72** engages the first transverse pin **42**. The second semi-cylindrical seat **86** of the second support body **74** engages the rounded head **62** of the body of plastic material **60**. The compression spring **70** has opposite ends that rest against the first shoulder **78** of the first support body **72** and against the second shoulder **84** of the second support body **74**, respectively.

The elastic device **66** presses the first lever arm **56** against a first stop. In the illustrated embodiment, the first stop is formed by the third transverse pin **46**. The lever **54** is capable of pivoting around the second transverse pin **44** between a rest position illustrated in FIG. **8** and a position of maximum backward tilt illustrated in FIG. **9**. The angle of oscillation of the lever **54**, indicated by a in FIG. **9**, can be in the order of about 17°. During the pivoting of the lever **54** from the rest position to the position of maximum backward tilt, the spring **70** of the elastic device **66** is axially compressed and the elastic device **66** pivots around the first transverse pin **42**. In the position of maximum backward tilt, the lever **54** abuts against a second stop **90**, formed by a portion of the inner surface of the arcuate portion **40** of the rigid support **34**. The sleeve of relatively soft plastic material **64** has the function of damping the contact between the first lever arm **56** and the stops **46**, **90**.

Each oscillation joint **32** is fixed to the seat **14** or to the base structure **12** in a position in which the first arm **36** of the rigid support **34** extends in the longitudinal direction and the second arm **38** of the rigid support **34** extends in the vertical direction. In the illustrated example, the rigid support **34** is fixed to the seat **14**. Alternatively, the rigid support **34** may be fixed to the base structure **12**.

The rigid support **34** of each oscillation joint **32** is fixed within a corresponding hollow side housing **28** of the seat **14**. With reference to FIG. **5**, in the illustrated embodiment, each housing **28** is equipped with a plurality of perforated vertical pins **92** extending in the vertical direction and integrally formed with an inner wall of the housing **28**. Each pin **92** is inserted within the first arm **36** of the rigid support **34** through a corresponding hole **50**. The rigid support **34** is fixed to the seat **14** by means of self-tapping screws **94** which extend through respective holes **52** of the closing element **48** and engage the holes of the corresponding hollow pins **92** of the seat **14**.

The second lever arm **58** of each oscillation joint **32** is inserted and fixed within a corresponding integral hollow seat **30** of the backrest **16**. The fastening of the lever arm **58** within the respective seat **30** may be carried out by press-fitting or by means of screws, glue, etc. The second lever arm **58** projects upwardly from the upper end of the second arm **38** of the fixed support **34**. The lower edge of the backrest **16** is essentially positioned in line with the upper end of the second arms **38** of the rigid supports **34**. The hollow side housings **28** of the seat **14** have upwardly-bent rear portions covering the arcuate portions **40** and the second arms **38** of the rigid supports **34**. In this way, the elastic joints **32** are completely contained within the hollow side housings **28** of the seat **14** and the hollow side seats **30** of the backrest **16**. Therefore, the oscillation joints **32** are completely hidden from view. The oscillation joints **32** do not require the use of additional elements such as bellows or other coverings. The seat-backrest unit may be composed in order to appear as being formed by a single integral body instead of two separate elements as in normal chairs with tilting backrests.

Of course, without prejudice to the principle of the invention, the details of construction and the embodiments may be widely varied with respect to what is described and illustrated without departing from the scope of the invention as defined by the following claims.

The invention claimed is:

1. A chair comprising:

a base structure;

a seat fixed to the base structure;

a backrest, and

a pair of oscillation joints which connect the backrest to the seat or to the base structure so as to allow tilting of the backrest around a transverse axis between a rest position and a backwardly tilted position, wherein each of said oscillation joints comprises:

a rigid support having a first and a second arm essentially arranged according to an L shape;

an elastic device comprising a telescopic element including a first support body and a second support body having respective tubular portions connected together in a slidable manner by means of a guide shaft, and a helical compression spring arranged coaxially to said tubular portions of said telescopic element, wherein the elastic device is arranged within said first arm of the rigid support;

a rigid lever articulated to said second arm of the rigid support around a transverse pin and having a first and a second lever arm located on opposite sides with respect to said transverse pin, wherein said second lever arm protrudes upwards from one end of said rigid support and is fixed to a corresponding side edge of the backrest and wherein said support body of the elastic device is elastically pressed against one end of said first lever arm so that the elastic device applies an elastic force between said rigid support and said first lever arm,

wherein said rigid support has a first stop against which said lever rests in the rest position and a second stop against which said lever rests in the position of maximum backward tilt, and

wherein the elastic device is pivotally connected to a second transverse pin on the rigid support at the first support body.

2. A chair according to claim **1**, wherein the seat comprises two hollow side housings covering said rigid supports of said oscillation joints.

3. A chair according to claim **2**, wherein said rigid support is equipped with holes within which integral pins are inserted, protruding from a surface of the respective hollow side housing of the seat, said pins being engaged by respective fastening screws.

4. A chair according to claim **1**, wherein said lever carries a body of relatively rigid plastic material having a rounded head which cooperates with said second support body of the elastic device.

5. A chair according to claim **1**, wherein said first lever arm carries a sleeve of relatively soft plastic material cooperating with said first stop and with said second stop.

6. The chair according to claim **1**, wherein the lever is continuously free to oscillate with respect to the rigid support.

7. The chair according to claim **1**, wherein the lever is continuously free to oscillate against the elastic force of the elastic device.

8. The chair according to claim **1**, wherein the backrest is continuously free to tilt between the rest position and the position of maximum backward tilt.

9. A chair comprising:

a base structure;

a seat fixed to the base structure;

a backrest, and

a pair of oscillation joints which connect the backrest to the seat or to the base structure so as to allow tilting of the backrest around a transverse axis between a rest position and a backwardly tilted position, wherein each of said oscillation joints comprises:

a rigid support having a first and a second arm essentially arranged according to an L shape;

an elastic device comprising a telescopic element including a first support body and a second support body having respective tubular portions connected together in a slidable manner by means of a guide shaft, and a helical compression spring arranged coaxially to said tubular portions of said telescopic element, wherein the elastic device is arranged within said first arm of the rigid support and wherein said first support body is articulated to said first arm of the rigid support;

a rigid lever articulated to said second arm of the rigid support around a transverse pin and having a first and a second lever arm located on opposite sides with respect to said transverse pin, wherein said second lever arm protrudes upwards from one end of said rigid support and is fixed to a corresponding side edge of the backrest and wherein said support body of the elastic device is elastically pressed against one end of said first lever arm so that the elastic device applies an elastic force between said rigid support and said first lever arm,

wherein said rigid support has a first stop against which said lever rests in the rest position and a second stop against which said lever rests in the position of maximum backward tilt, and

wherein the seat comprises two hollow side housings covering said rigid supports of said oscillation joints.

10. The chair according to claim **9**, wherein said rigid support is equipped with holes within which integral pins are inserted, protruding from a surface of the respective hollow side housing of the seat, said pins being engaged by respective fastening screws.

11. The chair according to claim **9**, wherein said lever carries a body of relatively rigid plastic material having a rounded head which cooperates with said second support body of the elastic device.

12. The chair according to claim **9**, wherein said first lever arm carries a sleeve of relatively soft plastic material cooperating with said first stop and with said second stop.

13. A chair comprising:

a base structure;

a seat fixed to the base structure;

a backrest, and

a pair of oscillation joints which connect the backrest to the seat or to the base structure so as to allow tilting of the backrest around a transverse axis between a rest position and a backwardly tilted position, wherein each of said oscillation joints comprises:

a rigid support having a first and a second arm essentially arranged according to an L shape;

an elastic device comprising a telescopic element including a first support body and a second support body having respective tubular portions connected together in a slidable manner by means of a guide shaft, and a helical compression spring arranged coaxially to said tubular portions of said telescopic element, wherein the elastic device is arranged within said first arm of the rigid support and wherein said first support body is articulated to said first arm of the rigid support;

a rigid lever articulated to said second arm of the rigid support around a transverse pin and having a first and a second lever arm located on opposite sides with respect to said transverse pin, wherein said second lever arm protrudes upwards from one end of said rigid support and is fixed to a corresponding side edge of the backrest and wherein said support body of the elastic device is elastically pressed against one end of said first lever arm so that the elastic device applies an elastic force between said rigid support and said first lever arm,

wherein said rigid support has a first stop against which said lever rests in the rest position and a second stop against which said lever rests in the position of maximum backward tilt, and

wherein said lever carries a body of relatively rigid plastic material having a rounded head which cooperates with said second support body of the elastic device.

14. The chair according to claim **13**, wherein the seat comprises two hollow side housings covering said rigid supports of said oscillation joints.

15. The chair according to claim **14**, wherein said rigid support is equipped with holes within which integral pins are inserted, protruding from a surface of the respective hollow side housing of the seat, said pins being engaged by respective fastening screws.

16. The chair according to claim **13**, wherein said first lever arm carries a sleeve of relatively soft plastic material cooperating with said first stop and with said second stop.

17. A chair comprising:

a base structure;

a seat fixed to the base structure;

a backrest, and

a pair of oscillation joints which connect the backrest to the seat or to the base structure so as to allow tilting of the backrest around a transverse axis between a rest

position and a backwardly tilted position, wherein each of said oscillation joints comprises:

a rigid support having a first and a second arm essentially arranged according to an L shape;

an elastic device comprising a telescopic element including a first support body and a second support body having respective tubular portions connected together in a slidable manner by means of a guide shaft, and a helical compression spring arranged coaxially to said tubular portions of said telescopic element, wherein the elastic device is arranged within said first arm of the rigid support and wherein said first support body is articulated to said first arm of the rigid support;

a rigid lever articulated to said second arm of the rigid support around a transverse pin and having a first and a second lever arm located on opposite sides with respect to said transverse pin, wherein said second lever arm protrudes upwards from one end of said rigid support and is fixed to a corresponding side edge of the backrest and wherein said support body of the elastic device is elastically pressed against one end of said first lever arm so that the elastic device applies an elastic force between said rigid support and said first lever arm,

wherein said rigid support has a first stop against which said lever rests in the rest position and a second stop against which said lever rests in the position of maximum backward tilt, and

wherein said first lever arm carries a sleeve of relatively soft plastic material cooperating with said first stop and with said second stop.

18. The chair according to claim **17**, wherein the seat comprises two hollow side housings covering said rigid supports of said oscillation joints.

19. The chair according to claim **18**, wherein said rigid support is equipped with holes within which integral pins are inserted, protruding from a surface of the respective hollow side housing of the seat, said pins being engaged by respective fastening screws.

20. The chair according to claim **17**, wherein said lever carries a body of relatively rigid plastic material having a rounded head which cooperates with said second support body of the elastic device.

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